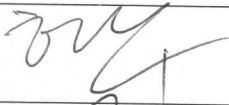



UN TEST REPORT

Report Number.....	SDI-UN-190402-02
Date of issue.....	2019.04.02
Test period.....	2019.03.15 ~ 2019.03.28
Testing Laboratory	Samsung SDI Co., Ltd
Address.....	467, Beonyeong-ro, Seobuk-gu, Cheonan-si, Chungcheongnam-do, Korea
Contact	+82-41-560-3114 / http://samsungsdi.co.kr/
Manufacturer's name	Samsung SDI Co., Ltd
Address.....	467, Beonyeong-ro, Seobuk-gu, Cheonan-si, Chungcheongnam-do, Korea
Contact	+82-41-560-3114 / http://samsungsdi.co.kr/
Test Standard.....	Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria, section 38.3 Sixth revised edition Amendment 1
Description.....	Lithium ion battery (1S - 1P)
Model Name.....	EB-BN975ABU
Ratings	3.86V 4370mAh (16.87Wh)
Mass	58.50g

Test Result

No.	Test item	Result	Remark
T-1	Altitude	PASS	
T-2	Thermal Cycling	PASS	
T-3	Vibration	PASS	
T-4	Shock	PASS	
T-5	External Short Circuit	PASS	
T-6	Impact / Crush	PASS	Component cell
T-7	Overcharge	PASS	
T-8	Forced Discharge	PASS	Component cell

	Name	Signature	Date
Reported by	Ham hyung woo		2019. 4. 2
Approved by	Hong Jong P. I		2019. 4. 2

T1	ALTITUDE SIMULATION TEST	Results
Requirements	No mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.	<input checked="" type="checkbox"/> No leakage, <input checked="" type="checkbox"/> No venting, <input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> No rupture, <input checked="" type="checkbox"/> No fire, <input checked="" type="checkbox"/> No mass loss, (Less than 0.2%) <input checked="" type="checkbox"/> No voltage drop (Residual OCV not less than 90%) See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(g)	Voltage After Test(V)	Weight After Test(g)	Residual OCV(%)	Percent of Weight Loss(%)
1	A	4.385	58.413	4.384	58.413	99.98	0.00
2	A	4.385	58.426	4.385	58.425	100.00	0.00
3	A	4.384	58.202	4.384	58.201	100.00	0.00
4	A	4.385	58.321	4.385	58.321	100.00	0.00
5	A	4.386	58.377	4.386	58.377	100.00	0.00
6	B	4.385	58.317	4.385	58.317	100.00	0.00
7	B	4.385	58.342	4.385	58.341	100.00	0.00
8	B	4.385	58.351	4.385	58.351	100.00	0.00
9	B	4.385	58.392	4.385	58.392	100.00	0.00
10	B	4.385	58.396	4.385	58.396	100.00	0.00

□ Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)

T2	THERMAL TEST	Results
Requirements	No mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.	<input checked="" type="checkbox"/> No leakage, <input checked="" type="checkbox"/> No venting, <input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> No rupture, <input checked="" type="checkbox"/> No fire, <input checked="" type="checkbox"/> No mass loss, (Less than 0.2%) <input checked="" type="checkbox"/> No voltage drop (Residual OCV not less than 90%) See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(g)	Voltage After Test(V)	Weight After Test(g)	Residual OCV(%)	Percent of Weight Loss(%)
1	A	4.384	58.413	4.304	58.410	98.18	0.00
2	A	4.385	58.425	4.304	58.421	98.15	0.01
3	A	4.384	58.201	4.304	58.200	98.18	0.00
4	A	4.385	58.321	4.305	58.320	98.18	0.00
5	A	4.386	58.377	4.305	58.372	98.15	0.01
6	B	4.385	58.317	4.302	58.311	98.11	0.00
7	B	4.385	58.341	4.304	58.335	98.15	0.01
8	B	4.385	58.351	4.303	58.345	98.13	0.01
9	B	4.385	58.392	4.301	58.391	98.08	0.00
10	B	4.385	58.396	4.304	58.391	98.15	0.01

□ Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)

T3	VIBRATION TEST	Results
Requirements	No mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.	<input checked="" type="checkbox"/> No leakage, <input checked="" type="checkbox"/> No venting, <input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> No rupture, <input checked="" type="checkbox"/> No mass loss, (Less than 0.2%) <input checked="" type="checkbox"/> No voltage drop (Residual OCV not less than 90%) See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(g)	Voltage After Test(V)	Weight After Test(g)	Residual OCV(%)	Percent of Weight Loss(%)
1	A	4.304	58.410	4.304	58.411	100.00	0.00
2	A	4.304	58.421	4.303	58.421	99.98	0.00
3	A	4.304	58.200	4.303	58.200	99.98	0.00
4	A	4.305	58.320	4.305	58.321	100.00	0.00
5	A	4.305	58.372	4.304	58.370	99.98	0.00
6	B	4.302	58.311	4.302	58.311	100.00	0.00
7	B	4.304	58.335	4.302	58.334	99.95	0.00
8	B	4.303	58.345	4.303	58.345	100.00	0.00
9	B	4.301	58.391	4.301	58.390	100.00	0.00
10	B	4.304	58.391	4.304	58.391	100.00	0.00

□ Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)

T4	SHOCK	Results
Requirements	No mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.	<input checked="" type="checkbox"/> No leakage, <input checked="" type="checkbox"/> No venting, <input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> No rupture, <input checked="" type="checkbox"/> No fire, <input checked="" type="checkbox"/> No mass loss, (Less than 0.2%) <input checked="" type="checkbox"/> No voltage drop (Residual OCV not less than 90%) See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(g)	Voltage After Test(V)	Weight After Test(g)	Residual OCV(%)	Percent of Weight Loss(%)
1	A	4.304	58.411	4.304	58.412	100.00	0.00
2	A	4.303	58.421	4.303	58.421	100.00	0.00
3	A	4.303	58.200	4.303	58.202	100.00	0.00
4	A	4.305	58.321	4.304	58.321	99.98	0.00
5	A	4.304	58.370	4.304	58.371	100.00	0.00
6	B	4.302	58.311	4.302	58.311	100.00	0.00
7	B	4.302	58.334	4.300	58.334	99.95	0.00
8	B	4.303	58.345	4.303	58.344	100.00	0.00
9	B	4.301	58.390	4.300	58.390	99.98	0.00
10	B	4.304	58.391	4.302	58.390	99.95	0.00

Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)

T5	EXTERNAL SHORT-CIRCUIT	Results
Requirements	External temperature does not exceed 170 °C and there is no disassembly, no rupture and no fire within six hours of this test.	<input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> No rupture <input checked="" type="checkbox"/> No fire. <input checked="" type="checkbox"/> External Temperature did not exceed 170 °C. see below table

Sample No.	Sample Condition	Maximum Temperature(°C)	Test result
1	A	57	O
2	A	57	O
3	A	57	O
4	A	57	O
5	A	57	O
6	B	57	O
7	B	57	O
8	B	57	O
9	B	57	O
10	B	57	O

□ Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)

Test result : O-No Disassembly, No Rupture, No Fire / D-Disassembly / R-Rupture / F-Fire

T6	<input type="checkbox"/> Impact / <input checked="" type="checkbox"/> Crush	Results
Requirements	Cells and component cells meet this requirement if their external temperature does not exceed 170°C and there is no disassembly and no fire during the test and within six hours after this test.	<input checked="" type="checkbox"/> External temperature did not exceed 170°C, <input checked="" type="checkbox"/> no disassembly, <input checked="" type="checkbox"/> no fire during test and within 6 hours after test See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Maximum Temperature(°C)	Test result
T6-1	C	3.778	21	O
T6-2	C	3.778	21	O
T6-3	C	3.778	21	O
T6-4	C	3.779	21	O
T6-5	C	3.778	21	O
T6-6	D	3.779	21	O
T6-7	D	3.778	21	O
T6-8	D	3.778	21	O
T6-9	D	3.778	21	O
T6-10	D	3.778	21	O

Supplementary Information:

Sample Condition C : at first cycle, in 50% charged states(5 pcs)

Sample Condition D : at 25th cycle, in 50% charged states(5 pcs)

Test result : O-No Disassembly, No Fire / D-Disassembly / F-Fire

T7	OVERCHARGE	Results
Requirements	Rechargeable batteries meet this requirement if there is no disassembly and no fire during the test and within seven days after the test.	<input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> no rupture, <input checked="" type="checkbox"/> no fire during the test and within seven days after the test. See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Test result
T7-1	A	4.385	O
T7-2	A	4.385	O
T7-3	A	4.385	O
T7-4	A	4.385	O
T7-5	B	4.385	O
T7-6	B	4.385	O
T7-7	B	4.385	O
T7-8	B	4.385	O

Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(4 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(4 pcs)

Test result : O-No Disassembly, No Fire / D-Disassembly / F-Fire

Test Conditions

Charge voltage : 8.86V, Charge current : 11.362A, Test time : 24Hr

T8	FORCED DISCHARGE	Results
Requirements	Rechargeable cells meet this requirement if there is no disassembly and no fire during the test and within seven days after the test.	<input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> no rupture, <input checked="" type="checkbox"/> no fire during the test and within seven days after the test. See below table

Sample No.	Sample Condition	Test result	Sample No.	Sample Condition	Test result
T8-1	E	O	T8-11	F	O
T8-2	E	O	T8-12	F	O
T8-3	E	O	T8-13	F	O
T8-4	E	O	T8-14	F	O
T8-5	E	O	T8-15	F	O
T8-6	E	O	T8-16	F	O
T8-7	E	O	T8-17	F	O
T8-8	E	O	T8-18	F	O
T8-9	E	O	T8-19	F	O
T8-10	E	O	T8-20	F	O

Supplementary Information:

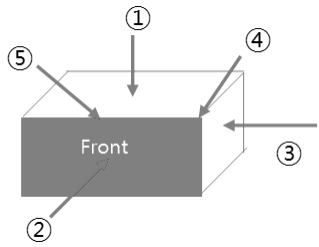
Sample Condition E : at first cycle, in fully discharged states (10 pcs)

Sample Condition F : after 25th cycles ending in fully discharged states(10 pcs)



Test result : O-No Disassembly, No Fire / D-Disassembly / F-Fire

Test Conditions



Initial test current : 4.37A, Test duration : 1Hr

P1	Package Drop Test	Results
Procedure	<p>IATA Dangerous Goods Regulations Each package must be capable of withstanding a 1.2m drop test in any orientation</p> 	<p><input checked="" type="checkbox"/> Without damage to cells or batteries contained therein, <input checked="" type="checkbox"/> Without shifting of the contents so as to allow battery to battery(or Cell to cell) contact. <input checked="" type="checkbox"/> Without release of contents</p> <p>See below photo</p>

Battery Qty per box	Battery weight (kg)	Net weight per box (kg)
160	0.058	9.28

	Before Test	After Test
Weight (kg)	10.36	10.36
Test result		

Sample Photo

front	back
	

- End of Report -